Aquaculture - Biofloc systems

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V(A). Planned Program (Summary)

1. Name of the Planned Program

Aquaculture - Biofloc systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
307	Animal Management Systems			80%	
403	Waste Disposal, Recycling, and Reuse			20%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.5	0.0
Actual	0.0	0.0	1.5	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	116764	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	34358	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

&bullConduct research project
&bullConduct training
&bullPresent data at conferences
&bullPublish results in scientific journals

2. Brief description of the target audience

The target audience is researchers, farmers, entrepreneurs, teachers, development workers and hobbyists. These are the categories of people who have accessed our results. The audience is local, national and international.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2007	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2007:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

? Abstracts presented at conferences

Year	Target	Actual
2007	1	2

Output #2

Output Measure

? Journal articles

Year	Target	Actual
2007	1	0

Output #3

Output Measure

? Short Courses

Year	Target	Actual
2007	{No Data Entered}	1

V(G). State Defined Outcomes

O No.	Outcome Name
1	Number of new farmers anywhere adopting aquaponic technology

Outcome #1

1. Outcome

Number of new farmers anywhere adopting aquaponic technology

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	1	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Farmers in the Virgin Islands are very interested in shrimp culture. A biofloc system has been developed for the production of tilapia in large (1/20 acre) tanks. If a polyculture system involving tilapia and shrimp could be developed and demonstrated to increase profitability, farmers would be interested in adopting this technology.

What has been done

An experiment was conducted to determine the effects of polyculture of monosex male Nile tilapia (Oreochromis niloticus) and two densities of Pacific white shrimp (Litopenaeus vannamei) on growth, total production, and water quality in a low-salinity, biofloc system. The experiment was conducted in six, 30-m3 tanks and consisted of two treatments with three replicates each. Treatments were: low-density polyculture (LDP) and high-density polyculture (HDP). A commercially available sea salt (Crystal Sea(r) Marinemix) was added to each tank to achieve a salinity of 5 parts per thousand. All tanks contained four, 1-m3 cages. One-hundred male tilapia (average weight = 116 g) were stocked into each cage. Additionally, the LDP and HDP treatments were stocked with shrimp (PL20) at a rate of 100 shrimp/m3 and 200 shrimp/m3, respectively. Fish were fed ad libitum a 32% protein floating diet twice daily for twenty minutes and shrimp were fed three times daily based on a feed chart using a 30% protein shrimp diet. Water quality parameters were measured biweekly. Shrimp were sampled biweekly to determine growth rates.

Results

There was no significant difference in water quality between the two treatments for parameters measured. There was a significantly higher average weight of tilapia in HDP (586 g) compared to LDP (550 g). There was no significant difference in tilapia FCR (1.5) or survival (99%) between treatments. Tilapia production was significantly higher in the HDP (7.7 kg/m3) compared to the LDP (7.3 kg/m3). There was no significant difference in shrimp average weight (14.3 and 12.5 g) with the LDP and HDP, respectively. There was no significant difference in survival (6%), shrimp production (0.1 kg/m3), or FCR (15.0) between treatments. Total tank production was significantly higher in HDP (7.9 kg/m3) compared to LDP (7.6 kg/m3). There was no significant difference in overall FCR (1.6) between the two treatments.

Results showed the temperature, dissolved oxygen, pH, salinity, alkalinity, and hardness were optimal for shrimp and tilapia growth. However, nitrogenous waste levels were persistently high throughout the experiment for low-salinity shrimp culture, and the total suspended solids levels were low for a biofloc system. Confined tilapia are unable to effectively resuspend solids in the production system. Total suspended solids, an important component to the success of a biofloc system, create a three-dimensional area for nitrifying bacteria to colonize and metabolize wastes. As a result of low total suspended solids concentrations, nitrogenous waste levels were sub-optimal for shrimp survival throughout the experiment. It appeared that tilapia preyed on juvenile shrimp upon stocking. The Three fourth inch cage mesh size allowed tilapia to consume juvenile shrimp that passed through the mesh. Shrimp bioassays were performed in all tanks for the experiment's duration. Shrimp survival averaged 60% in the bioassays, further demonstrating that predation occurred and resulted in far more shrimp mortality than sub-optimal water quality parameters.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

? Other (None)

Brief Explanation

There were no external factors that had an impact on this project.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

? During (during program)

Evaluation Results

Key Items of Evaluation